

## WHAT IS CLAIMED IS:

- 1           1.     A method for providing resource discovery comprising:
  - 2                sending a first request message having a first selected scope;
  - 3                analyzing whether a confirm message is received from a discovered
  - 4     resource within the first selected scope in response to the first request
  - 5     message; and
  - 6                sending a second request message having a second selected scope
  - 7     when a confirm message is not received from a discovered resource in
  - 8     response to the first request message, the second selected scope being
  - 9     greater than the first selected scope.
  
- 1           2.     The method of claim 1 wherein the analyzing further
  - 2     comprises:
    - 3                setting a timer in response to the first request message being sent;
    - 4                detecting whether a confirm message is received before the timer
    - 5     expires; and
    - 6                terminating the resource discovery procedure when a confirm
    - 7     message is received prior to the expiration of the timer.
  
- 1           3.     The method of claim 2 wherein the detecting further
  - 2     comprises:
    - 3                determining whether a scope increase is allowed when a confirm
    - 4     message is not received before the expiration of the timer;
    - 5                terminating the resource discovery procedure when a scope increase
    - 6     is not allowed;

7 increasing the scope to the second selected scope when a scope  
8 increase is allowed; and  
9 resetting the timer.

1 4. The method of claim 3 wherein the determining further  
2 comprises inspecting fields of a response message and determining  
3 whether a scope increase is allowed based upon the response message  
4 and policies included therein.

1 5. The method of claim 1 wherein the sending further comprises  
2 transmitting the request message to a known multicast group.

1 6. The method of claim 1 wherein the scope comprises a hop  
2 count, the hop count representing a number of nodes in a multicast tree that  
3 the request message propagates.

1 7. The method of claim 6 further comprising decrementing the  
2 hop count at a node in the multicast tree receiving the request message and  
3 forwarding the request message to a next node in the multicast tree.

1 8. The method of claim 1 wherein the request message further  
2 comprises parameters for analyzes by a node receiving the request  
3 message.

1 9. The method of claim 8 wherein the parameters further  
2 comprises hop-by-hop parameters, the hop-by-hop parameters being

3 modified by intermediate nodes during the propagation of the request  
4 message in the multicast tree.

1 10. The method of claim 8 wherein the parameters further  
2 comprise destination parameters, the destination parameters being used by  
3 a resource being discovered using the request message to determine  
4 whether the resource responds using a confirm or a reject message.

1 11. The method of claim 1 further comprising:  
2 receiving the request message at a node in a multicast tree;  
3 decrementing a hop count included in the scope;  
4 modifying hop-by-hop parameters;  
5 determining whether the hop count is equal to zero;  
6 passing the request message down the multicast tree when the hop  
7 count is not equal to zero;  
8 examining destination parameters in the request message; and  
9 unicasting a response message in response to the request message.

1 12. The method of claim 11 wherein the response message  
2 comprises a decision field for indicating whether the response is a confirm  
3 message or a reject message, a returned hop count representing a value of  
4 the hop count field at the time the request message was received by the  
5 node and a returned hop-by-hop parameter field representing a value of  
6 hop-by-hop parameters received by the node in the request message after  
7 modification by the node.

1           13.    A method for locating an endpoint for setting up a connection,  
2   the method comprising:  
3           sending a first request message having a first selected scope to a  
4   known multicast group;  
5           setting a timer responsive to the first request message being sent;  
6           detecting whether a confirm message is received from an endpoint  
7   before the timer expires;  
8           terminating endpoint locating when a confirm message is received  
9   from an endpoint prior to the expiration of the timer;  
10          determining whether a scope increase is allowed when a confirm  
11   message is not received from an endpoint before the expiration of the timer;  
12          terminating endpoint locating when a scope increase is not allowed;  
13          increasing the scope to the second selected scope when a scope  
14   increase is allowed;  
15          resetting the timer; and  
16          sending a second request message having the second selected  
17   scope when a confirm message is not received from an endpoint in  
18   response to the first request message, the second selected scope being  
19   greater than the first selected scope.

1           14.    The method of claim 13 wherein the determining further  
2   comprises inspecting fields of a response message and determining  
3   whether a scope increase is allowed based upon the response message  
4   and policies included therein.

1           15.    The method of claim 13 wherein the scope comprises a hop  
2    count, the hop count representing a number of nodes in a multicast tree that  
3    the request message propagates.

1           16.    The method of claim 15 further comprising decrementing the  
2    hop count at a node in the multicast tree receiving the request message and  
3    forwarding the request message to a next node in the multicast tree.

1           17.    The method of claim 13 wherein the request message further  
2    comprises parameters for analyzes by a node receiving the request  
3    message.

1           18.    The method of claim 17 wherein the parameters further  
2    comprises hop-by-hop parameters, the hop-by-hop parameters being  
3    modified by intermediate nodes during the propagation of the request  
4    message in the multicast tree.

1           19.    The method of claim 17 wherein the parameters further  
2    comprise destination parameters, the destination parameters being used by  
3    an resource being discovered using the request message to determine  
4    whether the resource responds using a confirm or a reject message.

1           20.    The method of claim 13 further comprising:  
2            receiving the request message at a node in a multicast tree;  
3            decrementing a hop count included in the scope;  
4            modifying hop-by-hop parameters;  
5            determining whether the hop count is equal to zero;

6           passing the request message down the multicast tree when the hop  
 7   count is not equal to zero; '  
 8           examining destination parameters in the request message; and  
 9           unicasting a response message in response to the request message.

1           21.    The method of claim 20 wherein the response message  
 2   comprises a decision field for indicating whether the response is a confirm  
 3   message or a reject message, a returned hop count representing a value of  
 4   the hop count field at the time the request message was received by the  
 5   node and a returned hop-by-hop parameter field representing a value of  
 6   hop-by-hop parameters received by the node in the request message after  
 7   modification by the node.

1           22.    An article of manufacture for providing resource discovery  
 2   using multicast scope selection, the article of manufacture comprising a  
 3   computer readable medium having instructions for causing a processor to  
 4   locate a resource for establishing a connection thereto according to a  
 5   method, the method comprising:  
 6           sending a first request message having a first selected scope;  
 7           analyzing whether a confirm message is received from a discovered  
 8   resource within the first selected scope in response to the first request  
 9   message; and  
 10          sending a second request message having a second selected scope  
 11   when a confirm message is not received from a discovered resource in  
 12   response to the first request message, the second selected scope being  
 13   greater than the first selected scope.

1           23.    The article of manufacture of claim 22 wherein the analyzing  
2 further comprises:

3           setting a timer in response to the first request message being sent;

4           detecting whether a confirm message is received before the timer

5 expires; and

6           terminating the resource discovery procedure when a confirm

7 message is received prior to the expiration of the timer.

1           24.    The article of manufacture of claim 23 wherein the detecting  
2 further comprises:

3           determining whether a scope increase is allowed when a confirm

4 message is not received before the expiration of the timer;

5           terminating the resource discovery procedure when a scope increase

6 is not allowed;

7           increasing the scope to the second selected scope when a scope

8 increase is allowed; and

9           resetting the timer.

1           25.    The article of manufacture of claim 24 wherein the determining  
2 further comprises inspecting fields of a response message and determining  
3 whether a scope increase is allowed based upon the response message  
4 and policies included therein.

1           26.    The article of manufacture of claim 22 wherein the sending  
2 further comprises transmitting the request message to a known multicast  
3 group.

1           27.    The article of manufacture of claim 22 wherein the scope  
2 comprises a hop count, the hop count representing a number of nodes in a  
3 multicast tree that the request message propagates.

1           28.    The article of manufacture of claim 27 further comprising  
2 decrementing the hop count at a node in the multicast tree receiving the  
3 request message and forwarding the request message to a next node in the  
4 multicast tree.

1           29.    The article of manufacture of claim 22 wherein the request  
2 message further comprises parameters for analyzes by a node receiving the  
3 request message.

1           30.    The article of manufacture of claim 29 wherein the parameters  
2 further comprises hop-by-hop parameters, the hop-by-hop parameters being  
3 modified by intermediate nodes during the propagation of the request  
4 message in the multicast tree.

1           31.    The article of manufacture of claim 29 wherein the parameters  
2 further comprise destination parameters, the destination parameters being  
3 used by an resource being discovered using the request message to  
4 determine whether the resource responds using a confirm or a reject  
5 message.

1           32.    The method of claim 22 further comprising:  
2 receiving the request message at a node in a multicast tree;  
3 decrementing a hop count included in the scope;



4           modifying hop-by-hop parameters;  
 5           determining whether the hop count is equal to zero;  
 6           passing the request message down the multicast tree when the hop  
 7 count is not equal to zero;  
 8           examining destination parameters in the request message; and  
 9           unicasting a response message in response to the request message.

1           33.    The method of claim 32 wherein the response message  
 2 comprises a decision field for indicating whether the response is a confirm  
 3 message or a reject message, a returned hop count representing a value of  
 4 the hop count field at the time the request message was received by the  
 5 node and a returned hop-by-hop parameter field representing a value of  
 6 hop-by-hop parameters received by the node in the request message after  
 7 modification by the node.

1           34.    A discoverer, comprising:  
 2           a discovery unit; and  
 3           an application, operatively coupled to the discovery unit, the  
 4 application sending a notification to the discovery unit for locating an  
 5 endpoint application;  
 6           wherein the discovery unit sends a first request message having a  
 7 first selected scope to a multicast group, analyzes whether a desired confirm  
 8 message is received from an endpoint application in response to the first  
 9 request message; and sends a second request message having a second  
 10 selected scope when a desired confirm message is not received from the

11 endpoint application in response to the first request message, the second  
12 selected scope being greater than the first selected scope.

1 35. The discoverer of claim 34 further comprising a timer for  
2 setting a window for receiving the desired confirm message, wherein the  
3 discovery unit sets the timer in response to the first request message being  
4 sent, detects whether a confirm message is received before the timer  
5 expires and terminates the location of an endpoint when a confirm message  
6 is received prior to the expiration of the timer.

1 36. The discoverer of claim 35 wherein the discovery unit  
2 determines whether a scope increase is allowed when a desired confirm  
3 message is not received before the expiration of the timer, terminates the  
4 location of an endpoint when a scope increase is not allowed, increases the  
5 scope to the second selected scope when a scope increase is allowed and  
6 resets the timer.

1 37. The discoverer of claim 36 wherein the discovery unit  
2 determines whether a scope increase is allowed when a confirm message is  
3 not received before the expiration of the timer based upon the received  
4 response message and policies included therein.

1 38. The discoverer of claim 34 wherein the scope comprises a hop  
2 count, the hop count represent a number of nodes in a multicast tree that  
3 the request message propagates.

1           39.    The discoverer of claim 34 wherein the request message  
2 further comprises parameters for analyzes by a node receiving the request  
3 message.

1           40.    The discoverer of claim 39 wherein the parameters further  
2 comprises hop-by-hop parameters, the hop-by-hop parameters being  
3 modified by intermediate nodes during the propagation of the request  
4 message in the multicast tree.

1           41.    The discoverer of claim 39 wherein the parameters further  
2 comprise destination parameters, the destination parameters being used by  
3 an endpoint to determine whether the resource responds using a confirm or  
4 a reject message.

1           42.    The discoverer of claim 34 wherein the application and the  
2 discovery unit are co-located.

1           43.    The discoverer of claim 34 wherein the application and the  
2 discovery unit are not co-located.

1           44.    The discoverer of claim 43 wherein the discovery unit  
2 comprises a base transceiver station, a base station controller or a mobile  
3 services switching center.

1           45.    The discoverer of claim 43 wherein the application comprises a  
2 mobile terminal.